STANDARD
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CORPORATION

ARCNET®-PC120/PC220

NETWORK CONTROLLER BOARDS

Installation Guide

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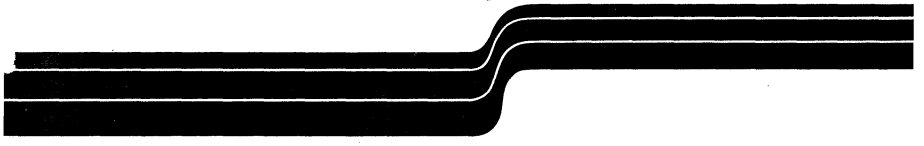

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FCC COMPLIANCE

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions in this guide, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.

INTRODUCTION

The ARCNET®-PC120 and -PC220 Network Controller Boards are designed to operate with any IBM® PC/XT™/AT® or compatible system, such as the IBM® PS/2™, Models 25 and 30. These half-slot boards, employing Surface Mount Technology (SMT) and incorporating a new Customer Specific Integrated Circuit (CSIC) for increased reliability, serve as an interface between the PC and an ARCNET® token-passing Local Area Network.

Each board is equipped with a standard BNC female connector for connection to RG-62/U coaxial cable. The PC120 board is designed for point-to-point connections in traditional star networks, while the PC220 is normally used in bus networks.

By utilizing a minimum address space—2K without the auto-boot PROM or 10K with it—these boards may be used in conjunction with both the enhanced graphics adapter (EGA) and the Intel® Above™ Board cards without conflict. All switches and jumpers are clearly labeled, and the switches, now located on the side edge, are easily accessible so they can be modified without removing the board. Instructions for configuring the switches and jumpers on these boards are provided in this guide.

An 8K by 8 EPROM socket is provided on each board for an auto-boot PROM. This PROM, 2764A or equivalent, is available for all networking software supplied by SMC®. The PROM enables a diskless PC to access the network. The PROM also may be used as a convenience on any system with floppy and/or hard disk drives.

Note that each SMC® Network Controller Board has an identifying label on its outer edge. This label, which contains the board type (e.g., PC120,

PC220) and space for the PC identification number or node ID, is readable without disassembling the PC.

To determine the type of Network Controller Board in the PC, just read the label. The label also simplifies network expansion. By checking the label on each board in the network, you can easily verify that the node ID you have selected for an additional PC is unique.

The PC120 boards are interchangeable with the older boards designed for star networks (that is, the PC110 boards and the PC100 boards). Similarly, the PC220, PC210 and PC200 boards for bus networks are also interchangeable. In addition, any bus topology board may be substituted for a star topology board as long as the board is properly terminated.

Specifications	ARCNET®-PC120	ARCNET®-PC220
Size	5.3" x 3.9" (13.5cm x 9.9cm)	5.3" x 3.9" (13.5cm x 9.9cm)
Temperature:		
Operating	0° to 70°C	0° to 70°C
Storage	– 40° to + 70°C	– 40° to + 70°C
Relative Humidity:		
Operating	10% to 80%	10% to 80%
Storage	5% to 90%	5% to 90%
Cabling:		
Coaxial	RG-62/U	RG-62/U
BNC Connector	isolated ground	isolated ground
Power:		
+ 5 volts	@ 660 mA max.	@ 695 mA max.
– 5 volts	@ 20 mA max.	@ 270 mA max.

CONFIGURING THE BOARD

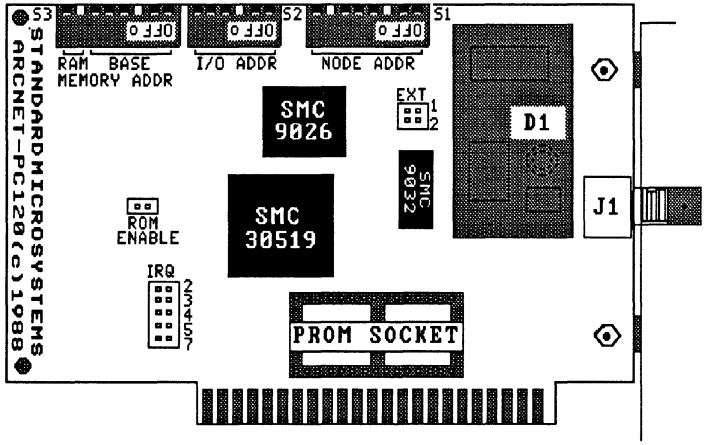
The ARCNET®-PC120 and -PC220 Network Controller Boards contain three groups of side-actuated switches and three sets of jumpers to allow for a wide range of configurations, as well as an EPROM socket for an optional auto-boot PROM. They are shown in the block diagram on the following page. Before the board is installed in a workstation, these switches and jumpers must be set and, if necessary, the PROM must be installed.

If you will be installing Novell®'s NetWare®, please refer to the Installation Supplement for Novell® Software before setting these switches and jumpers.

The eight switches in switch group S1 are used to select the unique PC identification number or node ID. Switch group S2 contains six switches which are used to select the base I/O port address. The first six switches of switch group S3 are used to set the base memory (RAM) buffer address; the last two switches are for the RAM offset.

Each switch is equivalent to a logical zero (0) when set to the ON or CLOSED position and a logical one (1) when set to the OFF or OPEN position.

- For lever-type switches, push the switch up (towards the OFF position) to set it to a logical one, or down to set it to a logical zero.
- For slider-type switches, DOWN is the same as OFF.
- For rocker-type switches, press in as far as possible on the side of the switch labeled ON to set it to the ON position.



Legend:

SMC®	9026	LAN Controller
SMC®	9032	LAN Transceiver
SMC®	30519	ASL (ARCNET® Support Logic)
S1	1-8:	Node ID Select
S2	1-6:	Base I/O Port Address Select
S3	1-6:	Base Memory (RAM) Buffer Address Select
	7-8:	RAM Offset Select
EXT		Extended Timeout Select
IRQ		Interrupt Select
ROM ENABLE		ROM Enable Select
J1		BNC RG-62/U Connector
D1		Transceiver: PC120 – SMC® Hybrid 9068 Coax PC220 – SMC® Hybrid 9058 High Impedance (HIT)

ARCNET®-PC120/PC220 Block Diagram

Jumper set IRQ contains five jumpers which are used to select the interrupt level. The two jumpers in the set labeled EXT are used to select the network timeout parameters. The single jumper labeled ROM ENABLE is used to enable the ROM after an auto-boot PROM has been installed.

To select a jumper, connect the two pins of the jumper with a shorting plug.

- When the plug is in, the jumper is selected.
- When the plug is out, the jumper is not selected.

Once the boards have been configured, please refer to the manufacturers' instructions for installing expansion cards in each PC.

Setting the Node ID

The eight switches in group S1 are used to set the PC identification number or node ID. Each node attached to the network must have a unique node ID. An explanation of how to set the switches to correspond to a particular node ID appears below. To simplify the installation procedure, a table of decimal node IDs and corresponding switch settings begins on the next page. Note that a node ID of zero is not permitted.

Switch 1 serves as the least significant bit (LSB) for the node ID. Note that the decimal value of each switch is shown below to simplify the conversion of the node ID from decimal to binary.

For example, to set the node ID to 23 decimal, find the numbers in the "Value" row below that add up to 23 (23 = 16 + 4 + 2 + 1). Set those switches to the OFF position and the remaining switches to the ON position.

	LSB ⇓ switches								
	1	2	3	4	5	6	7	8	
Switch	-	-	-	x	-	x	x	x	On/Closed = 0
Group S1	x	x	x	-	x	-	-	-	Off/Open = 1
Value	1	2	4	8	16	32	64	128	

Node ID = 23 decimal = 1 + 2 + 4 + 16

After setting these switches, be sure to write the node ID on the identifying label located on the outer edge of the board.

Node ID Decimal	Switches 1 to 8	Node ID Decimal	Switches 1 to 8	Node ID Decimal	Switches 1 to 8
1	1000 0000	31	1111 1000	61	1011 1100
2	0100 0000	32	0000 0100	62	0111 1100
3	1100 0000	33	1000 0100	63	1111 1100
4	0010 0000	34	0100 0100	64	0000 0010
5	1010 0000	35	1100 0100	65	1000 0010
6	0110 0000	36	0010 0100	66	0100 0010
7	1110 0000	37	1010 0100	67	1100 0010
8	0001 0000	38	0110 0100	68	0010 0010
9	1001 0000	39	1110 0100	69	1010 0010
10	0101 0000	40	0001 0100	70	0110 0010
11	1101 0000	41	1001 0100	71	1110 0010
12	0011 0000	42	0101 0100	72	0001 0010
13	1011 0000	43	1101 0100	73	1001 0010
14	0111 0000	44	0011 0100	74	0101 0010
15	1111 0000	45	1011 0100	75	1101 0010
16	0000 1000	46	0111 0100	76	0011 0010
17	1000 1000	47	1111 0100	77	1011 0010
18	0100 1000	48	0000 1100	78	0111 0010
19	1100 1000	49	1000 1100	79	1111 0010
20	0010 1000	50	0100 1100	80	0000 1010
21	1010 1000	51	1100 1100	81	1000 1010
22	0110 1000	52	0010 1100	82	0100 1010
23	1110 1000	53	1010 1100	83	1100 1010
24	0001 1000	54	0110 1100	84	0010 1010
25	1001 1000	55	1110 1100	85	1010 1010
26	0101 1000	56	0001 1100	86	0110 1010
27	1101 1000	57	1001 1100	87	1110 1010
28	0011 1000	58	0101 1100	88	0001 1010
29	1011 1000	59	1101 1100	89	1001 1010
30	0111 1000	60	0011 1100	90	0101 1010

Node ID Decimal	Switches 1 to 8	Node ID Decimal	Switches 1 to 8	Node ID Decimal	Switches 1 to 8
91	1101 1010	121	1001 1110	151	1110 1001
92	0011 1010	122	0101 1110	152	0001 1001
93	1011 1010	123	1101 1110	153	1001 1001
94	0111 1010	124	0011 1110	154	0101 1001
95	1111 1010	125	1011 1110	155	1101 1001
96	0000 0110	126	0111 1110	156	0011 1001
97	1000 0110	127	1111 1110	157	1011 1001
98	0100 0110	128	0000 0001	158	0111 1001
99	1100 0110	129	1000 0001	159	1111 1001
100	0010 0110	130	0100 0001	160	0000 0101
101	1010 0110	131	1100 0001	161	1000 0101
102	0110 0110	132	0010 0001	162	0100 0101
103	1110 0110	133	1010 0001	163	1100 0101
104	0001 0110	134	0110 0001	164	0010 0101
105	1001 0110	135	1110 0001	165	1010 0101
106	0101 0110	136	0001 0001	166	0110 0101
107	1101 0110	137	1001 0001	167	1110 0101
108	0011 0110	138	0101 0001	168	0001 0101
109	1011 0110	139	1101 0001	169	1001 0101
110	0111 0110	140	0011 0001	170	0101 0101
111	1111 0110	141	1011 0001	171	1101 0101
112	0000 1110	142	0111 0001	172	0011 0101
113	1000 1110	143	1111 0001	173	1011 0101
114	0100 1110	144	0000 1001	174	0111 0101
115	1100 1110	145	1000 1001	175	1111 0101
116	0010 1110	146	0100 1001	176	0000 1101
117	1010 1110	147	1100 1001	177	1000 1101
118	0110 1110	148	0010 1001	178	0100 1101
119	1110 1110	149	1010 1001	179	1100 1101
120	0001 1110	150	0110 1001	180	0010 1101

Node ID Decimal	Switches 1 to 8	Node ID Decimal	Switches 1 to 8	Node ID Decimal	Switches 1 to 8
181	1010 1101	206	0111 0011	231	1110 0111
182	0110 1101	207	1111 0011	232	0001 0111
183	1110 1101	208	0000 1011	233	1001 0111
184	0001 1101	209	1000 1011	234	0101 0111
185	1001 1101	210	0100 1011	235	1101 0111
186	0101 1101	211	1100 1011	236	0011 0111
187	1101 1101	212	0010 1011	237	1011 0111
188	0011 1101	213	1010 1011	238	0111 0111
189	1011 1101	214	0110 1011	239	1111 0111
190	0111 1101	215	1110 1011	240	0000 1111
191	1111 1101	216	0001 1011	241	1000 1111
192	0000 0011	217	1001 1011	242	0100 1111
193	1000 0011	218	0101 1011	243	1100 1111
194	0100 0011	219	1101 1011	244	0010 1111
195	1100 0011	220	0011 1011	245	1010 1111
196	0010 0011	221	1011 1011	246	0110 1111
197	1010 0011	222	0111 1011	247	1110 1111
198	0110 0011	223	1111 1011	248	0001 1111
199	1110 0011	224	0000 0111	249	1001 1111
200	0001 0011	225	1000 0111	250	0101 1111
201	1001 0011	226	0100 0111	251	1101 1111
202	0101 0011	227	1100 0111	252	0011 1111
203	1101 0011	228	0010 0111	253	1011 1111
204	0011 0011	229	1010 0111	254	0111 1111
205	1011 0011	230	0110 0111	255	1111 1111

Setting the Base I/O Port Address

The six switches in switch group S2 are used to select the base I/O port address. This address may be set to a hexadecimal number in the range 0 to 3F0, in increments of 16 decimal (10 hex). Normally, addresses below 200 hex are not used. An explanation of how to set the switches to correspond to a particular address appears below. To simplify the installation procedure, a table of hexadecimal base I/O port addresses and corresponding switch settings begins on the next page.

The sixth switch serves as the least significant bit (LSB). The first two switches are used for the first digit of the address; the last four switches, for the second digit. The last digit of the address is always zero. Note that the decimal value of each switch is shown below to simplify conversion from hex to binary.

For example, to set the base I/O port address to 2E0 hex, find the numbers in the "Value" row for the first digit that add up to 2. Then, find the numbers in the same row for the second digit that add up to E (8 + 4 + 2). Remember, a hexadecimal A = 10, B = 11, C = 12, D = 13, E = 14, and F = 15. Set those switches to the OFF position and the remaining switches to the ON position.

	switches						
	1	2	3	4	5	6	⇐ LSB
Switch Group S2	-	x	-	-	-	x	On/Closed = 0
	x	-	x	x	x	-	Off/Open = 1
Value	2	1	8	4	2	1	
Digit	{first}		{	second		}	

Base I/O address = {2} {8 + 4 + 2} {0} = 2E0 hex

I/O Address Hex	Switches 1 to 6	I/O Address Hex	Switches 1 to 6
200	10 0000	300	11 0000
210	10 0001	310	11 0001
220	10 0010	320	11 0010
230	10 0011	330	11 0011
240	10 0100	340	11 0100
250	10 0101	350	11 0101
260	10 0110	360	11 0110
270	10 0111	370	11 0111
280	10 1000	380	11 1000
290	10 1001	390	11 1001
2A0	10 1010	3A0	11 1010
2B0	10 1011	3B0	11 1011
2C0	10 1100	3C0	11 1100
2D0	10 1101	3D0	11 1101
2E0	10 1110	3E0	11 1110
2F0	10 1111	3F0	11 1111

Switch settings for popular networking software packages are provided at the end of this topic.

Setting the Base Memory (RAM) Buffer Address

Switches one through six of switch group S3 are used to select the base memory buffer address; switches seven and eight are used for the RAM offset. The memory buffer requires 2K of RAM. The base address of this buffer may be set to a hex number in the range 0 to FC000, in increments of 16K and, within that address space, the buffer may be assigned any one of four positions, determined by the offset, switches seven and eight. Three additional expansion cards may utilize the three unused 2K blocks of memory. The remaining 8K is reserved for ROM.

Normally, base addresses below C0000 and above F0000 are not used.

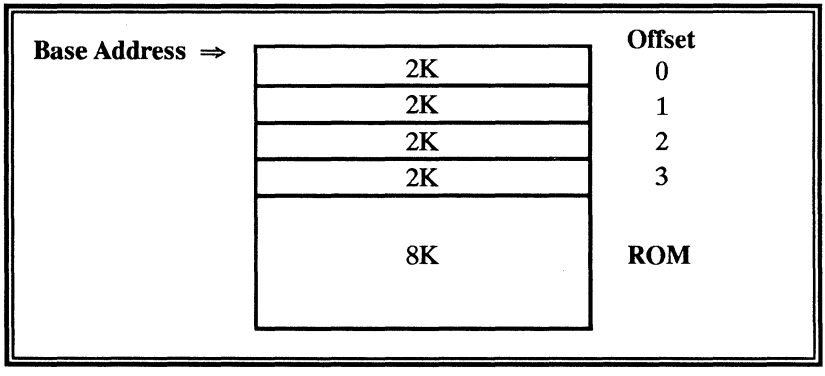


Illustration of 16K Memory Buffer Address Space

An explanation of how to set the switches to correspond to a particular address is given on the next page. To simplify the installation procedure, a table of hexadecimal base RAM buffer addresses and corresponding switch settings follows.

Switch six is the least significant bit (LSB) of the base address; switch eight is the LSB of the offset. Switches one through four are used for the first digit of the address. Switches five and six, a zero and switch seven comprise the second digit of the address. The third digit is calculated using switch eight followed by three zeros. Digits four and five are always zero. Note that the decimal value of each switch is shown below to simplify conversion from hex to binary.

For example, to set the RAM buffer address to D0000 hex, find the numbers in the "Value" row that add up to D (8 + 4 + 1). Remember, a hexadecimal A = 10, B = 11, C = 12, D = 13, E = 14, and F = 15. Set those switches to the OFF position and the remaining switches to the ON position.

						Base LSB ⇓		Offset LSB ⇓	
				switches					
	1	2	3	4	5	6	7	8	
Switch	-	-	x	-	x	x	x	x	On/Closed = 0
Group S3	x	x	-	x	-	-	-	-	Off/Open = 1
Value	8	4	2	1	8	4	1	8	
Digit	{	first		}	{	second	}	{third}	

RAM buffer address = {8 + 4 + 1} {0} {0} {0} {0} = D0000 hex

Switch settings for popular networking software packages can be found at the end of this topic.

RAM Address	Switches 1 to 8	RAM Address	Switches 1 to 8
C0000	1100 00 00	D8000	1101 10 00
C0800	1100 00 01	D8800	1101 10 01
C1000	1100 00 10	D9000	1101 10 10
C1800	1100 00 11	D9800	1101 10 11
C4000	1100 01 00	DC000	1101 11 00
C4800	1100 01 01	DC800	1101 11 01
C5000	1100 01 10	DD000	1101 11 10
C5800	1100 01 11	DD800	1101 11 11
C8000	1100 10 00	E0000	1110 00 00
C8800	1100 10 01	E0800	1110 00 01
C9000	1100 10 10	E1000	1110 00 10
C9800	1100 10 11	E1800	1110 00 11
CC000	1100 11 00	E4000	1110 01 00
CC800	1100 11 01	E4800	1110 01 01
CD000	1100 11 10	E5000	1110 01 10
CD800	1100 11 11	E5800	1110 01 11
D0000	1101 00 00	E8000	1110 10 00
D0800	1101 00 01	E8800	1110 10 01
D1000	1101 00 10	E9000	1110 10 10
D1800	1101 00 11	E9800	1110 10 11
D4000	1101 01 00	EC000	1110 11 00
D4800	1101 01 01	EC800	1110 11 01
D5000	1101 01 10	ED000	1110 11 10
D5800	1101 01 11	ED800	1110 11 11

Setting the Timeouts and Interrupts

The jumper set labeled EXT is used to determine the timeout parameters. The two jumpers in this set are normally left open. Refer to the COM 9026 Data Sheet for alternate configurations.

Jumper set IRQ is used to select the interrupt level. The numbers next to each of the five jumpers correspond to the interrupts. The function of each jumper is given below. Be sure to select only a single interrupt. Please refer to the appropriate software documentation for the proper interrupt values.

Jumper	Function
2	INTR = IRQ2
3	INTR = IRQ3
4	INTR = IRQ4
5	INTR = IRQ5
7	INTR = IRQ7

Settings for Networking Software

Switch and jumper settings for two of the popular networking software packages are provided below. These are the most common settings. With different hardware configurations and future versions of software, other settings may be required.

Software	S2 Switches 1 to 6	S3 Switches 1 to 8	IRQ Selected
NetWare®	101110	11010000	2
ViaNet®			
non-AT®	101110	11100000	2
AT®*	101110	11010000	2

Remember, a switch is equivalent to a logical zero when it is set to the ON position and a logical one when it is set to the OFF position.

* With these settings, the software batch file must be changed. Consult your ViaNet® manual for specifics.

Installing the Auto-Boot PROM

An optional auto-boot PROM, 2764A or equivalent, may be installed in the EPROM socket on the board. With this PROM, a diskless PC can access the network by booting from the network disk. The PROM can also be used in PCs having floppy and/or hard disk drives.

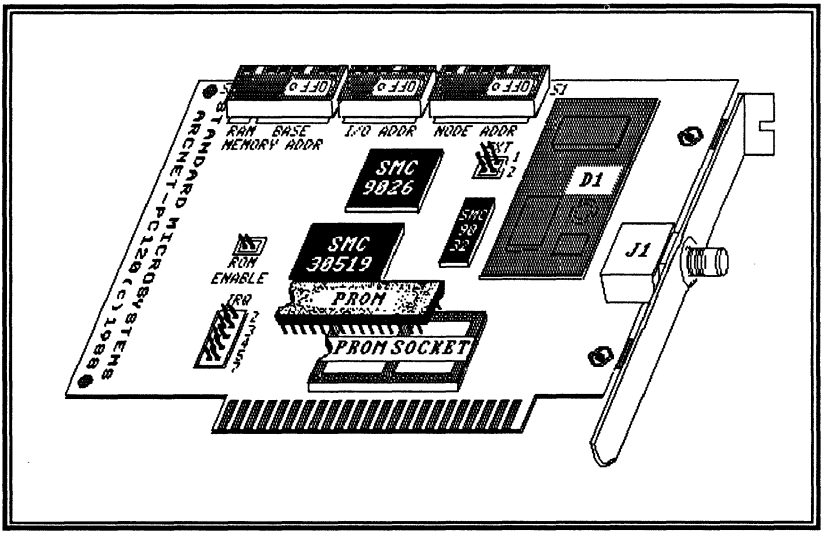
The PROM, once installed in the EPROM socket on the board, requires 8K of the 16K memory space (ROM) allocated to the memory buffer (see the topic titled "Setting the Base Memory Buffer Address" for an illustration of the 16K memory space). To enable this ROM, the jumper labeled ROM ENABLE must be selected by connecting the pins with a jumper plug.

To install the PROM, follow the steps below and refer to the illustration on the next page:

1. Locate the notch at one end of both the PROM and the socket. Position the PROM over the socket so that these notches coincide.

2. Place the PROM on top of the socket and check to be sure that each pin is aligned with one of the receptacles on the socket.

3. Push the PROM into the socket gently, making sure not to bend the pins on the PROM.



Installing the PROM

CONFIGURING THE NETWORK

ARCNET® is one of the easiest LANs to install. It offers a flexible topology with few limitations or restrictions. Since there are only a few interconnect rules, and they are so simple to follow, it is difficult to configure an ARCNET® network incorrectly.

PCs, also known as workstations or nodes, may be connected either to a star or bus network. These simple wiring schemes can be easily combined with twisted pair and fiber optic products into a single network, providing complete flexibility for the network designer.

This flexibility carries over into network modification. As long as the rules for connecting components are observed, workstations can be removed from the network and relocated with ease, and new workstations can be added whenever necessary.

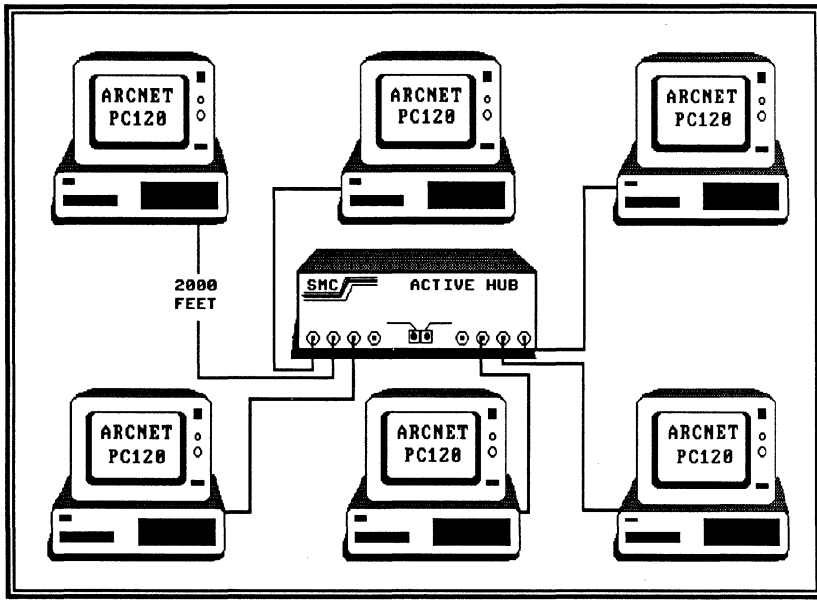
Since SMC® ARCNET® products do not become obsolete, newer products can be used with the older ones in the same network.

A knowledge of the rules for constructing both star and bus networks, and for connecting ARCNET® products to the coaxial cable, combined with careful site planning, will enable you to determine the type and quantity of hardware that will be needed and simplify network installation.

Configuring a Star Network

Up to eight PCs, each containing a PC120 board, can be connected, point-to-point, to an Active Hub to form a star network. The workstations may be located up to 2,000 feet (609.6m) from the 8-port hub.

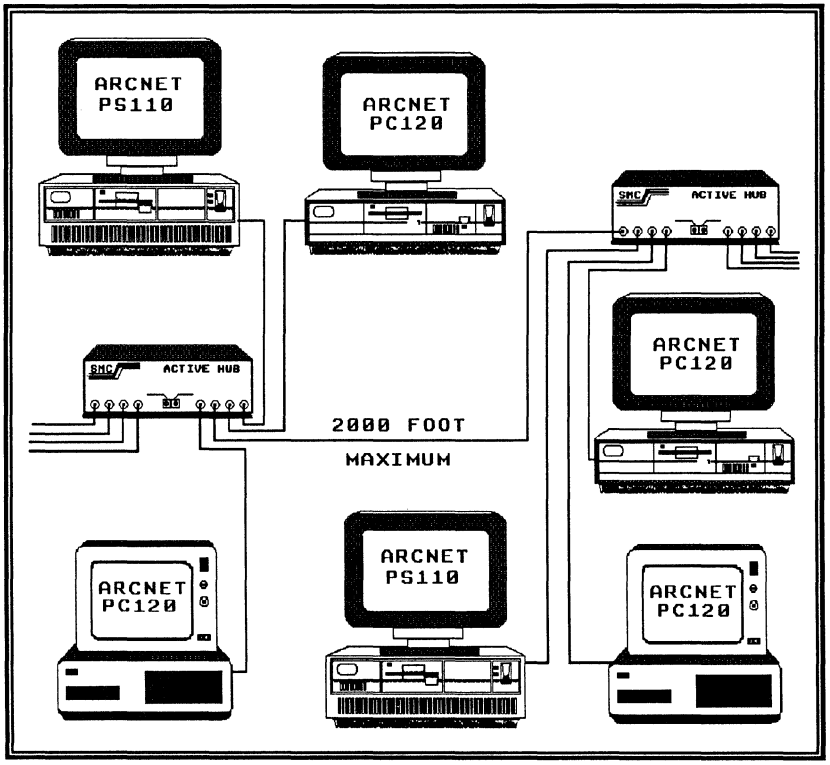
This wiring scheme, especially well-suited to prewiring of the site, is recommended for widely separated workstations – workstations located on different sides of a building or even on different floors.



Star Topology

Expanding a Star Network

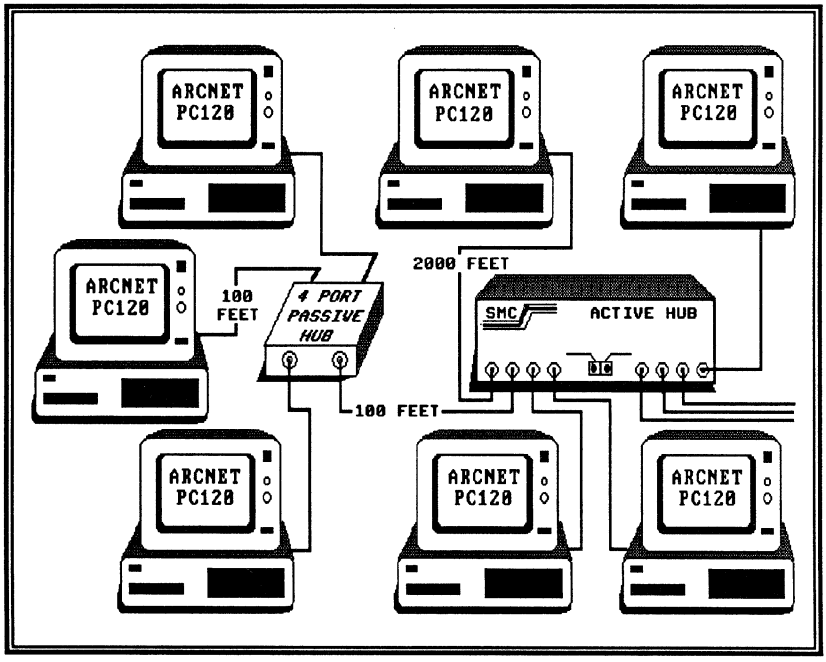
Additional PCs can be added to the network by linking Active Hubs together. The hubs may be placed up to 2,000 feet (609.6m) apart. This configuration is known as a "distributed star."



Distributed Star Topology

Also, any port on an Active Hub may be expanded by linking it to a 4-port Passive Hub. This allows two or three workstations located not more than 100 feet (30.5m) from the Passive Hub to be connected to the network. This configuration is also known as a "distributed star."

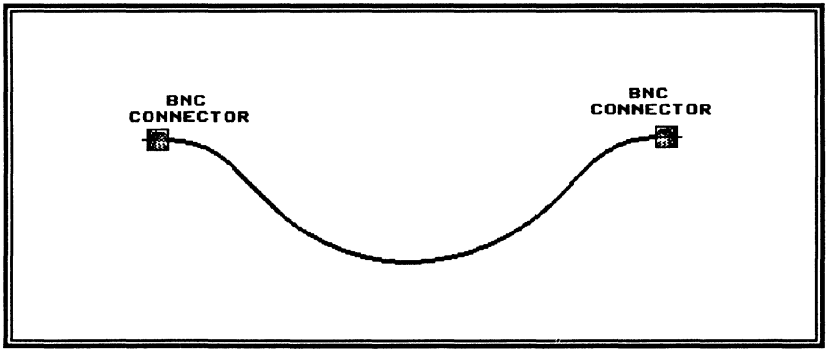
CAUTION...Failure to terminate an unused port on the Passive Hub will create reflections on the cable. These reflections may cause inconsistent operation.



Distributed Star Topology

Preparing Star Topology Cables

Each cable in a star network is used for point-to-point connections. One end of the cable may be connected to a board and the other end, to a hub, or the cable may be used to join two hubs. Since all boards and hubs are equipped with BNC female connectors, a BNC male connector must be installed at both ends of each cable before it can be used.

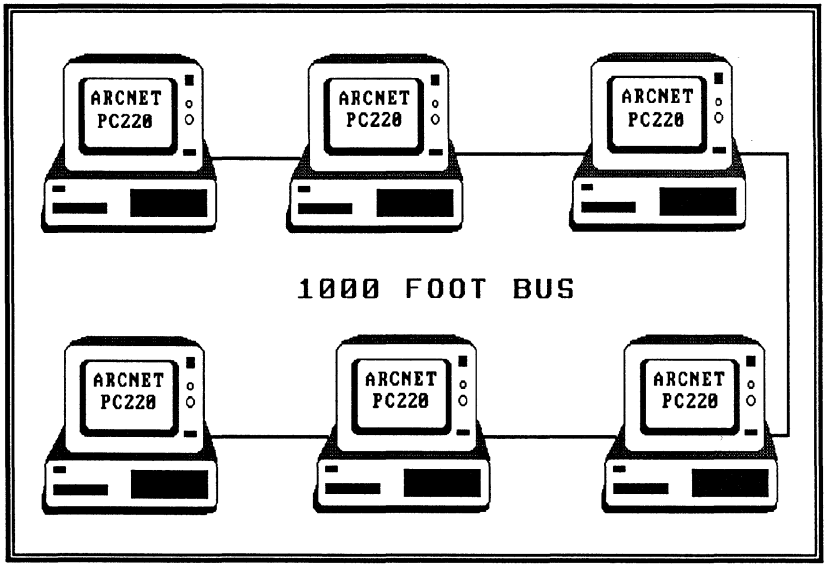


Star Topology Cable With BNC Male Connectors

Configuring a Bus Network

Up to eight PCs, each containing an ARCNET®-PC220 board, can be connected to coaxial cables with BNC T connectors to form a bus network. The workstations must be separated by a minimum of three feet (.9m) of cable. The bus can have a maximum length of 1,000 feet (304.8m), and must be terminated at both ends with a 93 ohm BNC terminator cap.

The newer bus topology, an economical choice since Active Hubs are not necessary and less cable is used, is recommended for today's modular offices where there are clusters of closely situated PCs.

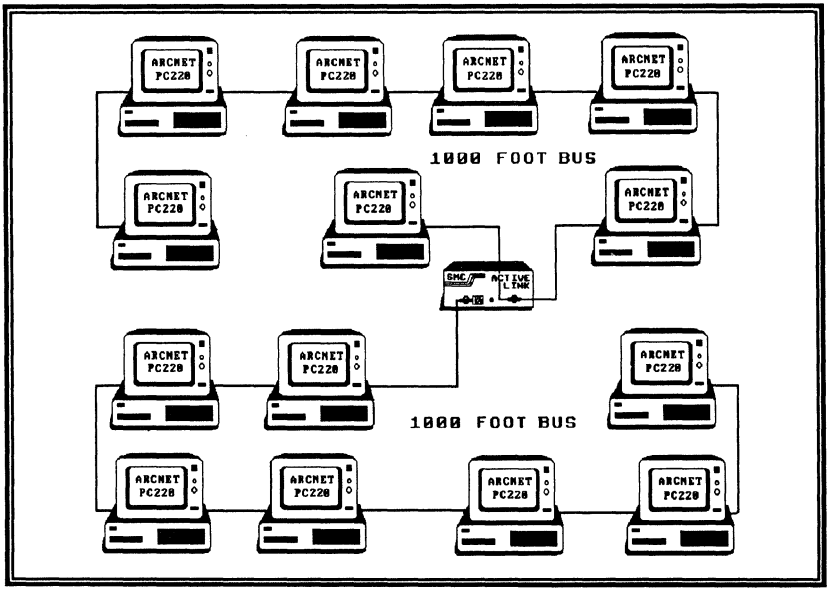


Bus Topology

Expanding a Bus Network

Additional PCs may be connected to the network by linking two bus cables via special 2-port hubs called Active Links. Each Active Link is connected directly to any point on the two cables, even the ends, with a BNC T connector.

A bus cable may contain any combination of up to eight PCs and Active Links. A network consisting of two bus cables linked together can contain a maximum of 14 PCs. Three bus cables can support a maximum of 20 PCs.



Expanded Bus Topology

Preparing Bus Topology Cables

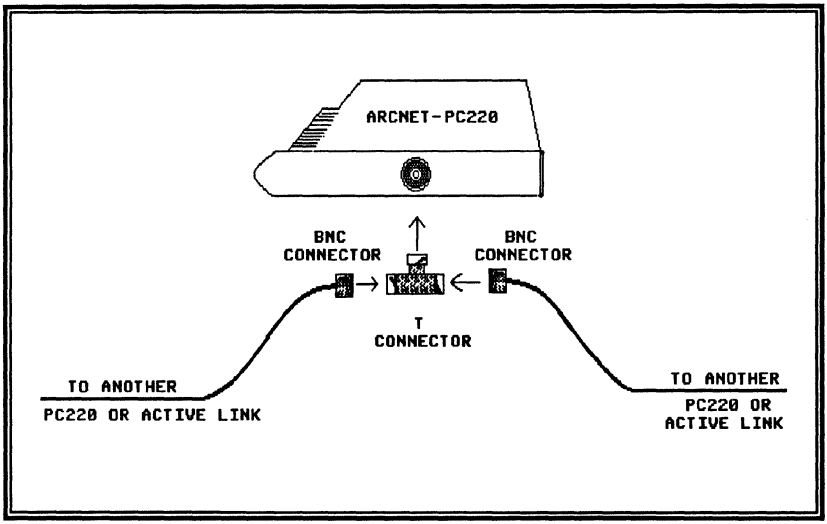
A bus cable is made up of a number of sections of coax cable, each a minimum of three feet (.9m) in length. A BNC male connector must be installed at both ends of each coax section (see "Preparing Star Topology Cables"). These sections of coax cable are joined by BNC T connectors, and the PC220 boards and Active Links are connected directly to these "T's."

Note that each bus cable must be terminated at both ends by a 93 ohm terminator cap.

Connecting PCs and Active Links to the Bus

To connect a PC to the bus, attach the male end of a BNC T connector to the PC220 board. Then, connect one end of a coax cable to one of the female ends of the T connector, and the other end of the cable to the BNC T connector attached to the adjacent PC.

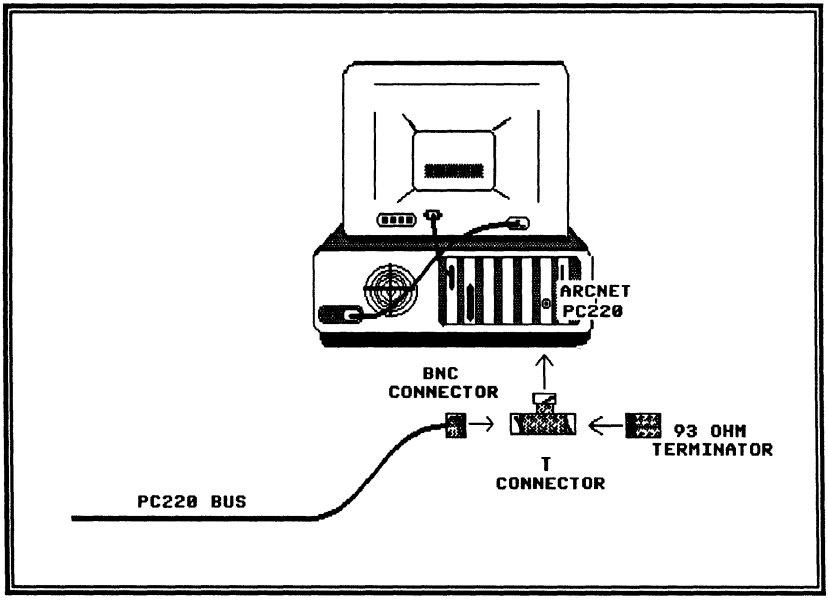
An Active Link is attached to two different buses in the same manner.



Connecting a PC220 Board to the Bus

Installing a Terminator

Both ends of each bus cable must be terminated by a 93 ohm BNC terminator cap. These caps are usually installed on the open ends of the BNC T connectors attached to the first and last PCs on the bus. However, if an Active Link is attached to either end of the bus, the cap must be installed on the "T" attached to this link.

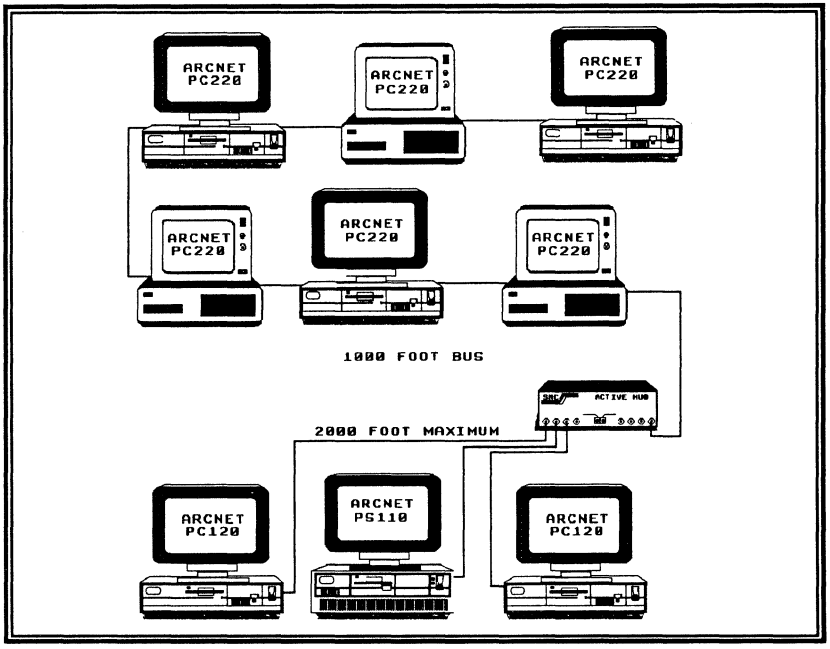


Installing a Terminator

Connecting Star and Bus Networks

Star and bus networks can be combined by simply connecting one end of a bus cable to any open port on an Active Hub. This enables the newer bus products to be used on an existing star network.

Also, the best features of both networks can be incorporated into a brand new network. For example, eight bus networks containing a total of 64 workstations may be connected to a single Active Hub.



Combined Star and Bus Topology

Summary of Connection Rules

A PC120 can be connected to:

- one PC120 board (forming a 2-node network), using up to 2,000 feet (609.6m) of cable with BNC male connectors at both ends
- an Active Hub, using up to 2,000 feet (609.6m) of cable with BNC male connectors at both ends
- a Passive Hub, using up to 100 feet (30.5m) of cable with BNC male connectors at both ends

A PC220 can be connected to:

- a bus cable, using a BNC T connector and a minimum of three feet (.9m) of cable with BNC male connectors at both ends
- an Active or Passive Hub, using a BNC T connector, a terminator and a cable with BNC male connectors at both ends; when a PC220 is used in place of a PC120 in a star network, the open end of the T connector must be terminated with a 93 ohm BNC terminator cap

A 4-port Passive Hub can be connected to:

- a PC120 board, using up to 100 feet (30.5m) of cable with BNC male connectors at both ends
- an Active Hub, using up to 100 feet (30.5m) of cable with BNC male connectors at both ends

An 8-port Active Hub can be connected to:

- a PC120 board, using up to 2,000 feet (609.6m) of cable with BNC male connectors at both ends
- another Active Hub, using up to 2,000 feet (609.6m) of cable with BNC male connectors at both ends
- a Passive Hub, using up to 100 feet (30.5m) of cable with BNC male connectors at both ends
- one end of a bus cable (maximum 1,000 feet/304.8m), in place of a 93 ohm BNC terminator cap

A 2-port Active Link can be connected to:

- a bus cable, using a BNC T connector and a minimum of three feet (.9m) of cable with BNC male connectors at both ends

Each bus cable:

- may be a maximum of 1,000 feet (304.8m) in length
- supports up to eight PCs, each separated by a minimum of three feet (.9m) of cable
- may be attached to another bus cable with an Active Link to expand the network; each Active Link reduces the number of PCs allowed on the bus cable by one
- must be terminated at both ends by a 93 ohm BNC terminator cap; one end of the bus may be connected to any open port on an Active Hub instead, to join star and bus topologies

Never create a loop with the network cable. A loop can be formed inadvertently by connecting hubs in such a manner that the cable attached to the last hub is also connected to the first hub.

The maximum cable distance between any two workstations located at opposite ends of the network is 20,000 feet/4 miles (6400m/6.4km).

Network Cable Lengths

Cable lengths for each type of network configuration are listed below:

From	To	Cable Length	Network Type
PC120	Active Hub	2000' (609.6m) max.	star
Active Hub	Active Hub	2000' (609.6m) max.	star
PC120	Passive Hub	100' (30.5m) max.	star
Passive Hub	Active Hub	100' (30.5m) max.	star
Bus start	Bus end	1000' (304.8m) max.	bus
PC220	PC220	3' (.9m) min.	bus
PC220	Bus cable	*	bus
Active Link	PC220	3' (.9m) min.	bus
Active Link	Bus cable	*	bus
Active Hub	Bus end	1000' (304.8m) max.	both

* The T connector must be connected directly to the bus and the PC220 or the Active Link.

Planning the Layout

The number of boards, hubs, links, BNC male connectors and BNC T connectors, and the amount of cable required depends upon the number of workstations you will have on the network, the type of topology being used, and the distance between the components.

For a star network, measure the distance between each workstation and the hub to which it will be connected. If multiple hubs will be used, also measure the distance between the hubs. For a bus network, measure the distance from one workstation to the next.

When measuring cable distances, remember to include the distance from the workstation to the ceiling or floor where the cable will be run. Be sure the cables will not be placed too close to a heat source or in areas where they might be damaged.

Sketch the layout on a piece of paper. Include the distances between components. You will use this sketch to determine your hardware requirements.

Star Topology Requirements

For each workstation on a star network, you will need one PC120 board and one cable with a BNC male connector attached to each end.

If the network is to have no more than four closely situated workstations, you will also need a Passive Hub. For larger networks, an Active Hub is required for every eight workstations. Each additional hub requires one cable with a BNC male connector attached to each end.

You may use a combination of Active and Passive Hubs to minimize the number of Active Hubs on the network. Each Passive Hub connected to an Active Hub can support three workstations. Therefore, one Active Hub and eight Passive Hubs can support a total of 24 workstations.

Bus Topology Requirements

For each PC on a bus network, you will need one PC220 board, one cable with a BNC male connector attached to each end and one BNC T connector.

If the bus network is to have more than eight workstations, or if a single 1,000 foot (304.8m) bus is not long enough to reach all the workstations on the network, you will need to add one or more Active Links to the network.

For each Active Link joining two bus cables, you will need two cables with BNC male connectors attached to each end and two BNC T connectors.

In addition, for each bus, you will need two 93 ohm terminator caps.

MODIFYING AN EXISTING NETWORK

Workstations can be easily moved or added while the star or bus network is operational.

Modifying a Star Network

To relocate a workstation which is cabled to a hub, just disconnect it, reroute the cable, and then reconnect the workstation.

To add a workstation to the network, just connect it to any open port on an Active or Passive Hub. If there are no more open ports, another hub must be linked to an Active Hub before the network can be expanded.

Modifying a Bus Network

To remove a PC or an Active Link from a bus network, just disconnect it from the BNC T connector. As long as the "T" remains in place, a node may be disconnected without disrupting network activity.

To add a PC or an Active Link to the bus, first remove the terminator cap from the BNC T connector at one end of the bus. Extend the bus by attaching another section of cable to the open end of the "T." Attach another BNC T connector to the end of the bus and install the terminator cap on the open end of this "T." Then, connect the new PC or Active Link to the "T."

Note that you can also add a T connector at any point along the cable. However, you must be sure to power down the workstations on this bus and then remove the bus from the network before splicing the cable.

If the bus is full, or if it is 1,000 feet (304.8m) long, another bus must be linked to the first with an Active Link before the network can be expanded.

WARRANTY AND SERVICE POLICY

Should you experience difficulty with your SMC® ARCNET® Network Systems Product and be unable to diagnose or correct the problem, you may return the product to your place of purchase for repair. Please be certain that your product is properly packed before shipment. If possible, use the original packaging.

In-Warranty Service

All SMC® ARCNET® Network Systems Products are warranted by Standard Microsystems Corporation against defects in workmanship and materials for a period of twelve (12) months from date of delivery. During the warranty period, Standard Microsystems Corporation will repair or, if necessary, replace defective components at no charge. Consult your Authorized SMC® Dealer or Distributor for In-Warranty Service.

This warranty does not apply if the product has been damaged by accident or misuse, or as a result of repairs or modifications made by unauthorized personnel.

No other warranty is expressed or implied. Standard Microsystems Corporation is not liable for consequential damages.

Out-of-Warranty Service

Beyond the twelve (12) month warranty period, Standard Microsystems Corporation will repair or replace defective components for a reasonable fee. All service work is warranted by Standard Microsystems Corporation for an additional ninety (90) day period from date of shipment of the repaired product. Consult your Authorized SMC® Dealer or Distributor for service repairs.

Policy on Changes

All SMC® ARCNET® Network Systems Products are sold on the basis of descriptive specifications in effect at the time of sale. Standard Microsystems Corporation reserves the right to make periodic changes or improvements to any SMC® product, but has no obligation to modify or update products once sold.

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